REMARKS

Claims 1-49 are pending in the instant application after this amendment adds new claims 48 and 49. Claims 2-5, 29, and 37-40 are withdrawn in response to a restriction requirement. Claims 1, 6-28, 30-36, and 41-46 are amended. No new matter is added by the amendments and new claims, which are supported throughout the specification and figures. In particular, the new claims are supported at least at pages 6, 16, and 17. In view of the following remarks, favorable reconsideration of this application is respectfully requested.

The Office Action asserts that only claims 1, 6-28, 30-36 and 41-47, even though claims 2-5, 29, and 37-40 have not been canceled. Claims 2-5, 29, and 37-40 are withdrawn based on Applicants election of claims 1, 6-28, 30-36, and 41-47. However, Applicants note that the election was with traverse, as acknowledged by the Examiner, and Applicants incorporate the argument presented in the election traversing the restriction requirement herein. MPEP 821.01 states that:

> [w]here the initial requirement is traversed, it should be reconsidered. If, upon reconsideration, the examiner is still of the opinion that restriction is proper, it should be repeated and made final in the next Office action. (See MPEP § 803.01.) In doing so, ***the examiner should reply to the reasons or arguments advanced by applicant in the traverse***.

(Emphasis added). Applicants therefore respectfully request that the Examiner respond to the traversal in the next communication from the Office.

The Office Action objects to claims 21-26, 28, 32-36, and 41-47, as being improper because these multiple claims depend on other multiple claims. Applicants herein amend these claims to remove multiple dependencies and conjunctive multiple dependencies, and therefore it is respectfully submitted that the amended claims are allowable.

Claims 6, 20, 22-26, 30-36, and 41-47 are objected to because they depend directly or indirectly on non-elected claims. In view of Applicants traversal of the restriction requirement, Applicants have not amended these claims. Since the restriction has not been made final, the objection is premature.

Claim 1 stands rejected under 35 U.S.C. §101 as being unpatentable because it is directed to matter not permitted to be patented. The Office Action asserts that the subject matter claimed lacks a "useful and tangible result." Applicants respectfully traverse.

Without admitting the propriety of the 35 U.S.C. §101 rejection, Applicants herein amend claim 1 in the preamble has been amended to positively recite "encoding" of plaintext "to create ciphertext". It is respectfully submitted that encoding of plaintext provides a useful and tangible result, as required. Additionally, Applicants amend the claim to recite that the ciphertext is output in step (j), and therefore it is respectfully submitted that this outputting of ciphertext provides an additional useful, concrete, and tangible result. Applicants therefore respectfully request that the rejection be withdrawn.

Claim 1 and 27 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for lacking certain antecedent basis. Applicants respectfully traverse.

Applicants amend claims 1 and 27 to resolve any antecedent basis issues, by amending the preamble to include the characteristic that the Oommen-Rueda tree has a root, branches and leaves. Therefore, it is submitted that the subsequent references to these items in the claimset has a proper antecedent basis, as required. Therefore Applicants respectfully request that this rejection be withdrawn.

Additionally, claim 1 stands rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to recite when steps b and c should cease. Applicants amend claim 1 to

clarify that steps (e) and (f) are repeated "until all of the plaintext has been processed". The amended claim clearly indicates that the processing continues until all of the plaintext has been processed. It is respectfully submitted that this should be sufficiently definite.

Claims 1, 6-20, 27, 28, and 30-31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,885,749 to Chang in view of U.S. Patent No. 6,411,714 to Yoshiura. Applicants respectfully traverse.

Claim 1 relates to a method for encoding plaintext to create ciphertext using an Oommen-Rueda tree, which Oommen-Rueda tree has a root, branches and leaves. The method of claim 1 includes, inter alia, receiving a first character of plaintext and traversing the Oommen-Rueda tree between the root of the Oommen-Rueda tree, and a leaf of the Oommen-Rueda tree corresponding to the first character of plaintext, and recording an Assignment Value of at least one branch of the Oommen-Rueda tree so traversed. The method of amended claim 1 further includes ***calculating a character of ciphertext related to the Assignment Value of the at least one branch of the Oommen-Rueda tree so traversed, and calculating an Assignment Value for at least one other branch of the Oommen-Rueda tree related to a distribution of the ciphertext previously calculated***. Amended claim 1 further includes traversing the Oommen-Rueda tree between the root of the Oommen-Rueda tree and a further leaf of the Oommen-Rueda tree corresponding to a next character of plaintext, ***calculating a further Assignment Value for at least one further traversed branch of the Oommen-Rueda tree related to a further distribution of the further ciphertext previously calculated***, and calculating a further character of ciphertext relating to the further Assignment Value for the at least one further traversed branch of the Oommen-Rueda tree.

A significant difference between the technology of the present invention and that of the cited art is the fact that the present technology utilizes, at each given point in time, a Branch Assignment Rule during the processing of the plaintext into ciphertext, and vice versa, ***which is related to the distribution of the ciphertext calculated prior to that point in time***. Neither of the prior art methodologies use, or claim to use, this technique. The present invention utilizes this technique, and thereby solves a previously unsolved problem. Therefore, it is respectfully submitted that the instant claims, which include this feature, are allowable over the cited references.

The instant invention provides various advantages over the prior art, including using the family of data structures being the set of Oommen-Rueda trees, a specific instantiation of which is the Huffman Tree. The instant invention also provides specifies various deterministic and randomized Branch Assignment Rules, all of which are applicable for the general family of Oommen-Rueda Trees. Additionally, a characteristic of each of the Branch Assignment Rules is that ***the Assignment Value, for the branch of the Oommen-Rueda tree traversed, is related to the distribution of the ciphertext calculated and recorded prior to that branch traversal***. Neither Chang nor Yoshiura disclose or suggest this feature. Indeed, the instant invention solves the open unsolved problem by virtue of this method.

The data-structure restructuring rule used in the instant invention involves an adaptive version of the specific Oommen-Rueda tree. The Branch Assignment rule used by Chang is defined in a string-wise manner, i.e., for the entire code word. For this, Chang needs to generate a code word table for every symbol, and, based on this table, perform the scrambling and then the encoding of the symbol. In stark contrast, the Branch Assignment rule of the instant invention is defined in ***a bit-wise manner for every single branch*** of the tree. As a result, the

time complexity of the Chang branch assignment rule for each encoded symbol is, on average, much higher than that of the instant invention. Also as opposed to the instant invention, Chang does not consider a randomized Branch Assignment Rule, which operates on every bit of every code word. Chang only specifies instantiations in which the randomized rule is used (for example, as a linear feedback shift register), in order to scramble the code words in their entirety.

While the instant invention achieves a Branch Assignment in a single module (while traversing the underlying data structure), Yoshiura achieves the Branch Assignment in a two-phase process. Notably, neither of the sub-processes represented by the two phases used by Yoshiura disclose or suggest the process used by the instant invention. Furthermore, the combined effect of the two sub-processes represented by the two phases used by Yoshiura does not have the same effect as the process used by the instant invention. The first phase in the Branch Assignment performed by Yoshiura randomly assigns the values of 0/1 to the edges based on a simple even/odd comparison to the outcome of a random number generator. The instant invention, on the other hand, bases its Branch Assignment on random numbers generated ***along the entire path of the tree***. Furthermore, the comparisons made are ***based on the path from the root to the leaf and the specific branch along the path***. The second phase in the Branch Assignment in Yoshiura is based on a deterministic Symbol-Bit String correspondence, which, in turn, relies on a set of Symbol-Bit String correspondences. For each encoded symbol, an exponential number of Symbol-Bit String correspondences are generated, and for each correspondence, the branch assignment is changed based upon the digits of the respective correspondence. Since the instant invention bases its Branch Assignment on random numbers generated along ***the entire path of the tree and on every single branch on this path***, the instant invention does not compute, or require the computation of, such symbol-Bit String

correspondences. This method according to the instant invention thereby avoids computing what could be an exponentially-large set.

During the second phase in the Branch Assignment invoked by Yoshiura, the branch assignments along a particular depth of the Huffman tree are changed by invoking reversals based on the specific Symbol-Bit String correspondence used. Again, these assignments are not dependent on ***the path from the root to the leaf nor on the specific branch along the path***. Furthermore, since the instant invention bases its Branch Assignment on random numbers generated along the entire path of the tree and on every single branch on this path, there are not comparable operations in Yoshiura.

The complexities of the processes assigning the Branch Assignments in the instant invention and Yoshiura are also completely different. In the case of the instant invention, the Branch assignment process requires an average time that is linear in the length of the branch associated with the symbol being encoded. Unlike Yoshiura, the instant invention does not require a possibly exponential number of computations to determine the set of Symbol-Bit String correspondences.

Therefore, for at least the above reasons, claim 1 is allowable over the cited references. Each of the other independent claims includes features similar to those discussed above in regard to claim 1, and therefore each of these claims is allowable for at least the same reasons as claim 1 is allowable. Each of the dependent claims is allowable for at least the same reasons as their respective base claim is allowable.

In view of the remarks set forth above, this application is believed to be in condition for allowance which action is respectfully requested. However, if for any reason the Examiner should consider this application not to be in condition for allowance, the Examiner is respectfully

requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

Any fee due with this paper may be charged to Deposit Account No. 50-1290.

Respectfully submitted,

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